Pest Alert

United States
Department of
Agriculture

Forest Service

Northeastern Area

NA-PR-02-00

Oak Tatters

The crown of a tree heavily affected by tatters may appear thin and lacy. Bur oak on right is heavily affected; trees on left are only lightly affected.
Photo courtesy of Ed Hayes, MN DNR.

Oak tatters is a relatively new condition that affects emerging oak leaves, causing them to appear lacy or tattered. It has been observed throughout the Midwestern United States, including Minnesota, Michigan, Wisconsin, Iowa, Illinois, Indiana, Ohio, and Missouri. This disorder was first reported during the 1980's in Iowa, Indiana and Ohio, but has been observed only in the last 10 years in Wisconsin and Minnesota.

Symptoms and Impact

Oak tatters affects primarily the white oak group, including white, bur, and swamp white. The red oak group (such as red, black, and shingle oaks) is only occasionally affected. Hackberry and other tree species may occasionally show similar symptoms. Newly emerged leaves of affected trees have reduced interveinal tissues, which gives leaves a lacy or tattered appearance. From a distance trees may appear to be light in color or to lack leaves.

Damage from oak tatters appears at the time of leaf emergence, generally in middle to late May. Within 2 or 3 weeks, heavily affected trees will produce a new flush of leaves that may not have tatters. These leaves may be smaller and lighter in color than normal leaves. The damage is often evenly distributed throughout the entire crown, but sometimes may be greater in the lower crown. It may affect all sizes and ages of scattered individual trees and whole stands of trees in woodlands or urban landscapes. Adjacent woodlands and trees may be unaffected.

Producing a new flush of replacement leaves reduces important stored energy reserves in affected trees. Healthy trees can survive this stress, but repeated damage or damage in combination with other stress events (such as drought, other defoliation, or site problems) may make trees more susceptible to decline, or to other damage agents such as the two-lined chestnut borer, ultimately resulting in tree death.

Symptoms of oak tatters on white oak. Note the absence of tissue between the veins. Photo courtesy of Dr. H. S. McNabb, Iowa State University.

A second flush of healthy leaves developing on white oak. Note the heavily tattered leaves from the first flush. Photo courtesy of Phil Marshall, IN DNR.

Other Damage Agents that it can be confused with

Oak tatters is a specific condition, but it can be confused with several damage agents that affect oak leaves:

- Oak anthracnose is a fungal disease that infects leaves and causes brown to black spots on leaf edges and along leaf veins. Anthracnose is most common during cool, wet springs.
- Some types of insect damage can also be confused with tatters. Some insects, like cynipid wasps, deform leaves or form galls. Caterpillar feeding on leaves may remove interveinal leaf tissue and make the foliage appear thin and lacy. Usually caterpillars will leave some sign, such as webbing or frass, or the insects themselves will be visible.
- Injury from herbicides can cause distortion or stunting of leaves, leaf kill, chlorosis, or leaf drop. On oaks, evidence of phenoxy herbicide damage is often demonstrated as tough leathery leaves.

Interveinal defoliation by fall cankerworm feeding in the spring. Photo courtesy of WI DNR.

Oak anthracnose disease. Note the dead, distorted areas on the affected leaves. Photo courtesy of Jill Pokorny, USDA Forest Service.

Cause

Oak tatters appears to be caused by damage to leaf tissue in the buds or as the buds begin to open for leaf expansion. The pattern of distribution suggests a relationship between the damage and the physiology or developmental stage of the host. Adjacent trees may differ in how they are affected because they may be at different stages due to genetics, environment, or other factors. Although causes of the damage are unproven, they may include one or more of the following factors:

- Low temperature injury before leaf expansion or during expansion of young succulent leaf tissues.
- Insects feeding or ovipositing in the buds or developing leaves. Insects suggested but not proven include thrips, plant bugs, leafhoppers, and agromyzid flies.
- Herbicides affecting the physiology of the tree, resulting in abnormal development of leaves. Herbicides have been shown to affect plant enzymes that regulate growth, resulting in malformed leaves and tissue. Information on long-term impacts of herbicides and herbicide mixtures on trees is limited.

Steps to Take

In woodlands, very little can be done to prevent additional damage to oak trees after an oak tatters event, except to reduce other stresses such as grazing of livestock. However, you can take several steps to minimize stresses to yard and urban landscape trees. Avoid site changes (i.e. cut, fill, and compaction) or protect trees and root systems if you plan changes. Mulch newly planted or established trees to reduce grass competition. To improve or maintain tree vigor, water during extended dry periods and fertilize trees that have a known mineral deficiency.

Authors:
Linda Haugen, USDA FS;
Phil Marshall, Indiana DNR;
Jane Cummings Carlson, Wisconsin DNR;
Mark Vitosh, Iowa State Univ. Extension; and
Ed Hayes, Minnesota DNR.